

AVIATION

OCTOBER 2, 1922

Issued Weekly

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Corville-Sperry Racer (380 hp. Wright), an Army entry in the Pulitzer Race, warming up for a trial flight

VOLUME
XIII

SPECIAL FEATURES

Number

14

THE PULITZER RACE ENTRIES DESCRIBED
THE ENTRIES IN THE CURTISS TROPHY RACE
RULES OF THE CURTISS MARINE FLYING TROPHY RACE

THE GARDNER, MOFFAT CO., INC.
HIGHLAND, N. Y.
225 FOURTH AVENUE, NEW YORK

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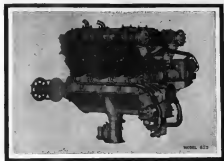
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Pay Load per hp.	0 lbs.
Total Useful Load per hp.	70.2 lbs.
Gross Capacity	86 gals.
Oil Capacity	12 gals.
Cargo Space in addition to Passengers	30 cu ft.
Total Cargo Space without Passengers	46 cu ft.

Two 90 hp. Le Rhone Engines are so installed that the E.S.-1 is easily assembled and disassembled in one hour.

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Maximum Accessibility of all Controls and Mechanisms. Parts mount very accessible and repair.

Equipment and Fundamentals. Complete every machine means for maintenance, accident and ease of operation.

Manufactured by skilled mechanics who have had years experience in the perfection and production of the lightest class airplane.

Everyone now engaged in or planning to enter the field of commercial aviation should know more about the Eliza-Stuper Biplane.

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AIRCRAFT DEPT.

BUFFALO, N. Y.

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OCTOBER 2, 1922

AVIATION

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CONTENTS

Editorial	409	El. R. Honeywell on the Gordon Bennett Balloon	420
The Great Stupine and Airplane Race	420	Race	421
Index of the Curtiss Marine Flying Trophy Race	420	How a Stupine is Launched	421
Characteristics of the Aircraft Entered in the Curtiss Trophy Race	421	Army and Navy Air News	422
Characteristics of the Aircraft Entered in the Pulitzer Trophy Race	422	Coming Aeronautical Events	423
		Foreign News	423

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GEO. NEWBLE MANAGING MANAGER

Vol. XXII

The Dearest Aviation Meet

THE Detroit Aviation Meet, which opens on October 7 with the Detroit Aerial Water Derby, including the Curtiss Marine Flying Trophy, and which closes to a close on October 14 with the Pulitzer Trophy race, America's speed classic, promises to be not only the most important flying meet of the year, but also the largest event of its kind ever staged in this country.

With its six distinct events, calling for practically all types of aircraft construction, from flying boats and float planes to multi-engine large capacity machines, and from light commercial ships to the high speed racer, the Detroit meet will afford the public an unparalleled opportunity of seeing in flight the principal and most modern aircraft we possess.

Leaving aside the purely spectacular features of this meet, and in particular of the Pulitzer Trophy race, where it is likely that new world's speed records will be established, the Detroit gathering may be expected to give the aeronautical world some extremely practical results. The development of the powerfully required racer will be of great benefit to the air service as that it will mark a new advance in pursuit ship design. A glance at the racer illustrated in this issue should bear out this statement. The prevalence of nacelles with overhead or semi-overhead wings seems to indicate that this type of construction has emerged from the experimental stage in which it was a year or so ago, when its very principle dictated much controversy.

What is very noticeable in all designs, is the careful manner in which all conveniences are streamlined and how the whole structure of the airplane is being increasingly molded in a single streamline body. The experiment of having serrated shaped indicators set into the wings in some of our racers probably the most original contribution of the forthcoming Pulitzer race, and the behavior of these indicators will be worth close watching.

An Echo of the Gordon Bennett Race

EVERYWHERE in the race there is a great letter from H. E. Housay, the well known balloonist who was one of the American competitors in the last Gordon Bennett Balloon Race, held at Geneva, Switzerland. Our readers will remember that some time elapsed before the winner of this race was officially announced, a delay which was due to the Belgian winner, Louis E. de Meyster, having his balloon carried away by the wind after alighting. The balloon was eventually found, however, and shipped back to Zerk together with the biography and the log book, whereby the Belgian pilot's claim to having crossed the greatest distance was substantiated.

With due respect to Captain Housay's opinion, we are inclined to doubt that he was deprived of the victory through what could not be considered the last final play—were it true. We cannot believe that the entire contest consisted of the

AVIATION

LAFAYETTE D'ORCY EDITOR
VICTOR E. CLARK
EDWARD P. WARRICK
RALPH H. LYNN CONTRIBUTING EDITOR

OCTOBER 2, 1922

No. 14

Aere Club of Switzerland was composed of such poor sportsmen as to juggle with the regulations in order to award the victory to a European instead of just because an American victory would have meant the end of the Gordon Bennett balloon race. Now it is apparent to us why the Swiss sportsmen who handled the event in such a splendid manner should have been particularly influenced in favor of the French and Belgian entrants. If J. Berry, an American, was disqualified in the 1912 race from Stuttgart, it should also be remembered that in the 1906 race—which by a curious coincidence also started from Zurich and was managed by the same Swiss Aere Club—it was the French entrant Alfred Leblanc who was disqualified for losing his balloon in the Carpathian mountains. Hence it would seem that the rule works both ways.

De Meyster "lost" his balloon only temporarily, and when it eventually turned up with the documentary evidence of his flight, it seems logical that he should have been awarded the cup.

It may be argued that the rules of the International Aeronautical Federation are not quite explicit on this point. Cases without precedent occur in races now and then and the setting of a precedent which becomes necessary often seems hard feeling. In the case of Captain Housay's it is evidently too late to lodge a protest with the Aere Club of Switzerland—this should have been done, if it was not, right after the race.

Weight Estimate in Preliminary Design

WHEN the preliminary design of an airplane has been laid down, it is a difficult matter to make changes in the detail design. Still more difficult is it to make changes in process of construction.

It is a peculiar thing that most new airplane designs require a certain amount of modification, or fail to live up to the estimate of performance because of an error in the weight estimate. The weight, as a rule, comes in run higher than the preliminary figures would show. Tail business follows in many instances, and always a decrease in performance.

In view of this well known fact, it is interesting to point out that the Bureau of Aeronautics, Navy Department, has developed a particularly efficient system of checking weights in process of design. While this checking system adds a good deal to the work of the drafting office, it has the great advantage of avoiding many disappointments at the trial flights.

We believe that almost as careful a weight estimate in the preliminary design would be well worth while applying in all cases. The experience of designers indicates that with careful stress analysis, dimensional sketches of some of the main parts, and—last but not least—generally careful work, very accurate estimates of weight can be obtained in aircraft design.

The Detroit Seaplane and Airplane Races

A Compendium of Useful Information Concerning
The Scheduled Events, the Ships and the Pilots

THE WHITE HOUSE
WASHINGTON

September 4, 1922

My dear Mr. Harding:

I have many times given expression to my interest in the development of aviation. I fully realize the influence which this interest and expedient means of transportation and travel is destined to exert upon civilization.

Aviation's vitally important part in the general scheme of our own national defense is already well recognized. A strong and healthy commercial aviation development is a prerequisite to all adequate plans involving our national security and welfare.

Therefore, it is with the greatest satisfaction that I extend to the Detroit Aviation Society one, through your committee, to the National Aeronautic Association my sincere appreciation of the objects you are working and my best wishes for the complete success both of the Detroit contests and of the national convention to be held subsequent therewith.

Sincerely yours,

Woodrow Wilson

Mr. Howard E. Griffin,
Chairman, Committee on Organization,
National Aeronautic Association.

President Harding commended the Detroit seaplane races and the annual National Aero Congress in the above letter

The Detroit Aviation Meet, organized by the Detroit Aviation Society of 4025 Woodward Ave., Detroit, Mich., was formally scheduled for the purpose of holding the third annual contest for the Pulitzer Trophy. However, in order to arouse the widest possible interest in flying and stimulate the development of commercial aviation in both land and sea going branches, the plans have been elaborated to include diversified types of planes.

Prizes in the various events will be awarded on the basis of the best combination of high performance and improved construction without, however, having recourse to too complicated rules incapable of being satisfactorily applied.

The Detroit Aviation Meet will be held from Oct. 7 to 14 inclusive, comprising the following events:

Event No. 1. Detroit Aerial Water Derby, including competition for the Curtiss Marine Flying Trophy, on Saturday, Oct. 7, with a total of \$2,000 of cash prizes.

Event No. 2. Detroit News Aerial Mail Trophy, a race for large seaplanes and land-based airplanes, with a total of \$2,000 of cash prizes, Thursday, Oct. 12.

Event No. 3. Aviation Country Club of Detroit Trophy,

a race for light commercial airplanes, with a total of \$2,000 cash prizes, Thursday, Oct. 12.

Event No. 4. Liberty Engine Builders Trophy, a race for observation type two-seater airplanes, with \$2,000 of cash prizes, Friday, Oct. 13.

Event No. 5. Pulitzer Trophy Race, a free-for-all race for high speed airplanes, with \$2,000 of cash prizes, Saturday, Oct. 14.

In each of the above the cash prizes are apportioned as follows: First Prize \$1,000; Second Prize \$600; Third Prize \$300.

Event No. 6. On-to-Detroit Race, a free-for-all race for airplanes flying to Detroit from a point 200 or more miles distant, with \$100 of cash prizes and silver living cup. To be completed Oct. 15-14.

The entry fee, \$100.00 will be refunded if the contestant is so far affected prior ready to start in the contest, provided the entry was received before Aug. 1, 1922. Entries received after that date, but prior to Aug. 5, are penalized \$25.00, and entries received after the latter date, but prior to Aug. 15, are penalized \$50.00.

October 2, 1922

AVIATION

491

Rules of the Curtiss Marine Flying Trophy Race

EVENT NO. 1, SATURDAY, OCT. 7

Detroit Aerial Water Derby, including Curtiss Marine Flying Trophy Cash Prizes

First Prize \$2,000.00
Second Prize 1,000.00
Third Prize 300.00

Total \$2,000.00

Free-for-All Race for Flying Boats and Seaplanes

Provisions of New 1922: Deal of Golf for Curtiss Marine Trophy

- The trophy shall be perpetual and competed for annually by seaplanes and flying boats.
- The contest shall be in the nature of a race either around a closed circuit or time point to point. The rules governing the race shall be those set down as by the Contest Committee of the Aero Club of America.
- The trophy shall be awarded each year to the Aero Club represented by the pilot of the winning machine, and this Club shall be entitled to the possession of the trophy until one month prior to the next succeeding contest, at which time the trophy shall be returned to the Aero Club of America. The Contest Committee of the Aero Club of America, with the approval of the Board of Governors, has the privilege of making such annual report for the Curtiss Marine Trophy, or of assigning this privilege, under sanction, to any other Club or organization.

1. Continuation of Contest

- Factor of safety.—Minimum—6 as loaded for start of race. Maximum—4 as loaded for start of race.
- Air speed greater than 75 m.p.h., as loaded for start of race.

- Velocity and maneuverability (water and air) which is opinion of Contest Committee, Detroit Aviation Society, is not a matter to the other contestants or spectators.

2. Distance

Approximately 300 miles—eight times around a closed course of 25 miles.

3. (a) Start

The starting signal will be given at 3 p. m. Pilots to be in their allotted places at 2 p. m. Pilot's meeting for the final instructions to be announced later.

(b) Position in Start

Placing according to class, and location prizes in addition to Curtiss Marine Trophy will be sent away together in a class, the faster classes starting before slower. Competitors for Curtiss Marine Trophy only will be sent away together after the classes.

(c) Method of Start

Contestants will be lined up along the shore in shallow water for the start. The Starter will assign an assistant starter to each plane who shall raise the signal flag for the pilot, as follows: The starting signal (for motor only). The flag will be raised by the Chief Starter at 2:45 p. m. When the motor on each plane is running, the assistant starter assigned to that plane will raise the red starting flag. When all machines are started and starting flag, but not later than 3:00 p. m., the Starter will raise, in addition to the red starting flag, the white warning flag, which signifies that the pilot's signal will be given in ten seconds; such signal will be given by lowering the red flag, the pilot's signal being the lowering of both red and white flag, at which time each plane No. 1 will take up to the starting line and fully throttle its motor to the satisfaction of the starter who shall then raise a red flag which is a signal to the seaplane to proceed

across the starting line at no greater speed. When the seaplane crosses the starting line between pylons B and K, the starter shall give the primary signal by raising a white flag. However, should the starter not be satisfied with the speed of the seaplane when it crosses the starting line, he shall raise a blue flag which signifies an irregular start and the seaplane will be required to return and try another start. As soon as the first plane has passed the starting line successfully, seaplane No. 2 which has in the meantime proceeded slowly from its starting position in shallow water will be signaled up to the starting line and sent away in the same order as seaplane No. 1. Seaplane No. 3 then proceeds seaplane No. 2 in the regular order, etc. In event of a plane making an irregular start as outlined above, the contestant shall make a right hand turn across pylon B, keeping well away from other seaplanes which are nearer to the starting line. The seaplane so delayed in its start shall not attempt a second start until all other seaplanes have been sent away and shall remain sufficiently well in advance to be completely out of the way of other contestants starting. If any contestant has difficulty in starting his motor, his assistant starter will not raise the red starting flag, but when the Chief Starter moves the white starting flag, the white warning flag, which is a signal for a deferred start. Deferred starts shall be granted without penalty, except that no plane will be started after a delay of two hours.

Any plane having once started cannot postpone another start; however, it may complete the race, though forced down, provided it can do so within 5:00 p. m.

4. The Finish

The finishing line will be taken when each plane flies across the finishing line between the marks defining that line, after having completed the full course, 300 miles.

5. The Winner

Of each first place shall be the pilot who has completed the full course in the shortest elapsed time, and of such being placed the second best time, etc., provided the pilot is not disqualified. The Curtiss Marine Trophy will be awarded to the Club represented by the winning pilot and the prize money paid to the contestant of the winning seaplane or flying boat. Agreements between pilots and contestants as to their professional share of the prize money will be kept by the Contest Committee, who will pay the prize money in accordance with agreements in writing between pilots and contestants, presented to the Contest Committee prior to the race or within 24 hours after the finish of the race.

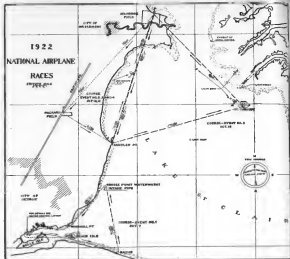
6. Qualifications

No seaplane or flying boat may take part in the contest unless it is piloted or commanded by a pilot, who may be on board and who must be furnished with a license issued by the Contest Committee of the Aero Club of America. (F.A.I. Rules, Art. 67). Every person furnished with pilot's certificate of F.A.I. must also have license issued by the Contest Committee of the Aero Club of America. (F.A.I. Rules, Art. 70). A license will be valid until the 31st December of the current year. The Contest Committee, Aero Club of America, may, upon application of any competent or competent person, issue a pilot for this one test only to any person whose qualifications it considers sufficient. (F.A.I. Rules, Art. 72). See also note under "Ratification" on page 1. Withdrawal of license for incompetence of pilot. (F.A.I. Rules, Art. 123).

7. Disqualifications

Any contestant breaking the rules of the race, or subsequent action which may be set out in writing, shall, upon recommendation of the judges, be disqualified.

Every person competing or taking part in a sporting event of whatsoever nature is bound to observe the following rules: (1) "To know the exact regulations." (F.A.I. Rules) Unlawfully. (2) "To agree to



Map showing the course to be flown by the planes participating in the flying trials of the Detroit Aviation Meet, Oct 7 and Oct. 12-24

subject without restriction to the consequences that result therefrom." (F.A.I. Rules, Art. 7).

B. Rules of the Race

- (a) Upon receiving the starting signal for the start, pilots shall hold a straight course and not cross or attempt to cross in front of the planes on either side.
- (b) From a standing start contestants will fly around the first four laps of the course, and during laps 4, 5 and 7 will be obliged to alight on the water and while running along the surface of the water enter into and pass through, in the proper direction, the water controls which shall be designated by marked markers on both sides. (Note: There will be only one water control in the shape of a bare pole down). The entrance into and exit from this control will be located sufficiently near the turning mark that anything but normal landing speeds or normal turning speeds will cause the turning mark and result in loss of time.
- (c) While within the markers bounding the water control, the contestants must maintain constant contact between the

water and foot surfaces of the principal flotation gear (wing or tail postrons, or water skids, or any other adjustable, movable or flexible attachment not subject contact with the water, under this rule).

- (d) A plane overcrosses, both planes being in the air, and hold its altitude and a true course, in order that it may sail in any way upwind or interfere with the faster overcrossing plane.
- (e) A plane overcrossing a slower plane, both planes being in the air, shall never pass or attempt to pass between the planes and any pilot or pilot need to mark a turning point.
- (f) Within the water control, both planes being in the water, the overcrossing plane must pass to the right and its mechanism of overcrossing plane must look in the rear and warn pilots of an overcrossing plane. Pilots of overcrossing planes must keep to the left and give the faster, overcrossing plane room to pass on the right.
- (g) The finishing line must be crossed in flight—not in the water—and, after crossing the finishing line, all planes shall continue on their course until they have attained sufficient

- (h) No contestant shall be permitted to "dodge" the fleet with plane acid, ether, or another highly explosive liquid. Anti-dodge laws may be used.

C. Protests

No protest shall be considered unless presented in writing to the Contest Committee of Detroit Aviation Society within twenty-four hours after the finish of the race. (F.A.I. Rules, 7b, 7c, 5b). (Appendix. See F.A.I. Rules, Art. 15b-17b).

D. Numbers

Each plane shall have a number assigned to it by the Contest Committee, painted on the bottom surface of lower wing and on each side of the fuselage, clear of the wing, in characters as large as possible. It shall have no other marking other than its number in height.

E. Discontinuities

"Competitors are forbidden to display on their apparatus or external any commercial advertisement except the trademark of the constructor of the apparatus" (F.A.I. Rules, Art. 5b).

F. Number of Contestants

Minimum number of contestants SIX.
Maximum number of contestants FIFTY.

Characteristics of the Aircraft Entered in the Curtiss Marine Flying Trophy Race Saturday, Oct. 7, 1922

The opening event of the Detroit Aviation Meet is the race for the Curtiss Marine Flying Trophy donated by Glenn H. Curtiss. This contest is open to airplanes of the float and boat types only, and is specially computed for water reduction up with special view to the progress achieved in airplane construction.

In this year's race the U. S. Navy has entered eleven planes, the characteristics of which are as follows.

Example VEII

Type VEII is the standard Vought two-seater advanced training plane now used by the Navy as an observation plane

and fitted with a pontoon. This airplane was designed and built by Clarence Vought in 1916 and is supplied on standard equipment to the Atlantic and Pacific Fleet Air Squadrons as a single-seater land plane for general training, as a two-seater land plane for general observation duty, and as a two-seater airplane as an observation plane to be carried aboard ships. Vought planes of this type are now on board the Maryland and have been successfully handled from the Maryland's catapult. The Wright K5, 8 cyl. engine is a modification of the standard 180 hp. K3 engine made by the same firm, the modification consisting essentially in high compression pistons, high lift valves and other alterations which permit the engine

Additional Prizes

The (to be announced later) prizes for greater air speed will be awarded to the contestant who, during the Curtiss Marine Trophy race, completes laps 2, 3 and 4 in the shortest total elapsed time. (The first lap is not included because of the standing start).

Additional prizes will be awarded for Class or Deviation races to be approved by the Contest Committee of the Detroit Aviation Society after entries have closed.

Exemptions

Streamlining which does not alter the structure of the part or parts streamlined.

Structures eligible for class races are determined by the above rule and those exemptions.

1. Streamlining which does not alter the structure of the part or parts streamlined.

2. Motors may be equipped with any make or design of propeller, gearbox, spark plugs, carburetor, including intake manifold, exhaust manifold, cooling and oil systems.

Deviation Races

The Contest Committee of the Detroit Aviation Society may award any of the trophies in competition for a special prize.

Note: The word plane as used in these rules means flying boats or airplanes.



Curtiss VEII (400 hp. Curtiss CDE), Navy entry No. 4 in the Curtiss Trophy race. Pilot: Lt. T. B. Lee, U.S.N., at Lt. E. H. Stederson, U.S.M.C.



Curtiss H-16 (330 hp Liberty's), Navy entry No. 2 in the Curtiss Trophy race. Pilot: Lt. E. Frost, U. S. N.

to develop between 220 and 240 hp at 2000 r.p.m.; revolutions. The high compression H-16 engine is designed for blended fuel.

CHARACTERISTICS

Type, motor float triplane.
Span, upper and lower—35 ft. 1 1/2 in.
Length, 30 ft. 3 in.
Height, 10 ft. 3 in.
Crew, 4 ft. 7 1/2 in.
Weight, 9,000 lb.
Angle of incidence, upper 1 deg. 42 min., lower 1 deg. 12 min.
Wing area, 524 sq. ft.
Wing span, 35 ft. 1 1/2 in.
Crew weight, 1,015 lb.
Engine, Liberty 12-cyl. V-8, 300 hp.
Pilot, Lt. E. Frost, U. S. N.

Curtiss H-16

The H-16 is a Curtiss designed and built triplane brought out in 1919 as an answer to high performance German triplanes which were interfering with the breaking operations conducted against the German submarine bases on the Belgian coast. The problem was to develop a fast two-seater triplane using a single Liberty engine. Due to change in conditions the H-16 type was never put into production, and the sample plane listed in 1919 has been reconditioned and entered in the Curtiss Marine Trophy Race, but fitted with a special high compression Liberty engine. This is a standard Liberty engine with high compression pistons and new valves and should develop over 400 hp on a blended fuel. The machine was designed by W. L. Eklund of the Curtiss Aeroplane & Motor Corp. in cooperation with Maj. E. L. Smith, U. S. Marine Corps.

CHARACTERISTICS

Type, motor float triplane.
Span, upper and lower, 35 ft. 0 in.
Length, 30 ft. 3 in.
Height, 11 ft. 3 in.
Crew, 4 ft. 3 in.
Weight, 9,000 lb.
Angle of incidence, 0.
Wing area, 524 sq. ft.
Wing span, 35 ft. 1 1/2 in.
Crew weight, 1,015 lb.
Engine, Liberty 12-cyl. V-8, 300 hp.
Pilot, Lt. E. Frost, U. S. N.

Curtiss H-16

The H-16 is a standard two Liberty engine flying boat used during the War both by the Americans and British forces for submarine patrol and convoy duty. The plane was designed by O. H. Curtiss and built by the Curtiss Aeroplane & Motor Corp. in 1915. The Navy Department has a large number of these planes on hand and the one entered in the race is standard in all respects except that the Liberty engines have been provided with special high compression pistons. The H-16 will be flown from the Naval Aircraft Factory in Detroit for the race, following the Hudson River, the Lake of New York State to the Great Lakes.

CHARACTERISTICS

Type, two motor flying boat.
Span, upper 35 ft. 1 in., lower 35 ft. 12 in.
Length, 40 ft. 0 in.
Height, 17 ft. 0 in.

Crew, 2 ft. 1 in.
Wing area, 1,114 sq. ft.
Wing span, 114 ft. 0 in.
Crew weight, 1,000 lb.
Engine, Liberty 12-cyl. V-8, 300 hp.
Pilot, Lt. E. Frost, U. S. N.

Coffey's H-16

The H-16 is a motor triplane designed by Edgar Coffey and built by the Coffey Aircraft Corp. in 1919. It was built for the Navy as a high speed two-seater triplane making use of the Coffey motor drive. It is believed to be the only gas engine plane in the country and in all considerable technical interest for this reason. It is fitted with a single Liberty engine mounted on the fuselage, which drives by means of a ring gear, a propeller which is situated immediately behind the wings. The fuselage or tail structure of the airplane is built through the center of the ring gear carrying the propeller.

CHARACTERISTICS

Type, motor triplane.
Span, upper 35 ft. 1 in., lower 35 ft. 12 in.
Length, 40 ft. 0 in.
Height, 17 ft. 0 in.
Crew, 2 ft. 1 in.
Wing area, 1,114 sq. ft.
Wing span, 114 ft. 0 in.
Crew weight, 1,000 lb.
Engine, Liberty 12-cyl. V-8, 300 hp.
Pilot, Lt. E. Frost, U. S. N.

Coffey's H-16

The H-16 is a new type of Vought observation triplane, being developed by the Chance Vought Corp. for the Navy Department as a replacement for the standard V-11 Vought now used on ships for anti-air warfare. The plane is equipped with the new Lawrence 250 hp. engine which presents a new feature in conventional engines in that it has removable cylinder heads.

CHARACTERISTICS

Type, motor float triplane.
Span, upper 35 ft. 1 in., lower 35 ft. 12 in.
Length, 40 ft. 0 in.
Height, 17 ft. 0 in.
Crew, 2 ft. 1 in.
Wing area, 1,114 sq. ft.
Wing span, 114 ft. 0 in.
Crew weight, 1,000 lb.
Engine, Liberty 12-cyl. V-8, 300 hp.
Pilot, Lt. E. Frost, U. S. N.

Curtiss H-16

Model 187 motor triplane was designed by C. S. Kirtland and built in 1919 by the Curtiss Aeroplane and Motor Corp. as a two-seater combat plane of maximum performance. Had



Curtiss H-16 (450 hp), Curtiss H-16 Navy entry No. 25 in the Curtiss Trophy Race. Pilot: E. A. J. Williams, U. S. N.

its War confirmed it is likely that this type would have been put into production for use on the Western Front. As it is, the sample plane made on trials at high speed of 162 m.p.h., which was then a world's record for any type of airplane and is still believed a world's record for a two-seater flying machine.

For the purpose of the Curtiss Marine Trophy Race two of these triplanes which were 18,000 lbs. have been reconditioned and fitted with portmotors to convert them to triplanes. They are fitted with the Curtiss C-12, 400 hp., a light 12-cyl. engine

slightly more pre-engineered. The T-12 is the same plane equipped with the Lawrence 250 hp. engine.

The T-12 is the same T-12 plane provided with a Lawrence 250-hp. engine, but gives special racing wings, and the T-12 is the same as the T-12 except that the Wright 32, 250 hp. engine has been substituted.

These four planes constitute then a full-scale experiment of the greatest technical interest in the Navy, using three different engines and two different designs of wings. The outcome of the Curtiss Marine Trophy Race has been used to try out



Navy Curtiss TS (300 hp Lawrence T-12), Navy entry No. 6 in the Curtiss Trophy Race. Pilot: Lt. S. W. Callaway, U. S. N.

specialty designed for this purpose. These triplanes are believed to be the only triplanes in the country and one of considerable technical interest on this coast.

CHARACTERISTICS

Type, motor float triplane.
Span, upper 35 ft. 1 in., lower 35 ft. 12 in.
Length, 40 ft. 0 in.
Height, 17 ft. 0 in.
Crew, 2 ft. 1 in.
Wing area, 1,114 sq. ft.
Wing span, 114 ft. 0 in.
Crew weight, 1,000 lb.
Engine, Liberty 12-cyl. V-8, 300 hp.
Pilot, Lt. E. Frost, U. S. N.

Navy TS and T-12 Types

Types T-12 and T-12, and T-12 and T-12 are witnesses of the Navy shipboard combat plane type TS designed under Comdr. J. C. Hunsaker by the Design Section of the Bureau of Aeronautics and built at the Naval Aircraft Factory. The TS planes were designed to give the smallest and most compact plane with the maximum facilities for take-down and conversion should they. All wires and hushhushes in the wing trailing are eliminated to facilitate rapid crossing. The fuel tank is carried in the lower wing and is made detachable so that in case of fire, due to an emergency belief, the pilot can pull a release which will drop the tank and its inflammable contents down of the machine. Another unique feature is the presence of a removable landing gear so that the TS plane may be used with land wheels as an ordinary land plane, as well as being used as a seaplane depending upon the service required.

The T-12 is equipped with a new Lawrence 250-hp. radial engine rated at 225 hp. This is the last word in air-cooled engine development and the race is considered an excellent place to give this engine a severe trial. The engine has been developed for the Navy especially for the problem of shipboard seaplanes where maximum weight and the greatest

these design modifications under competitive conditions. The plane under a maximum of new and advanced features both in engineering and construction, and it is believed that the race between these four planes is necessary in interest only to the race for the Curtiss Marine Trophy for which they will compete.

CHARACTERISTICS

Type, motor float triplane.
Span, upper and lower, 35 ft. 0 in.
Length, 40 ft. 0 in.
Height, 17 ft. 0 in.
Crew, 2 ft. 1 in.
Wing area, 1,114 sq. ft.
Wing span, 114 ft. 0 in.
Crew weight, 1,000 lb.
Engine, Liberty 12-cyl. V-8, 300 hp.
Pilot, Lt. E. Frost, U. S. N.

CHARACTERISTICS

Type, motor float triplane.
Span, upper and lower, 35 ft. 0 in.
Length, 40 ft. 0 in.
Height, 17 ft. 0 in.
Crew, 2 ft. 1 in.
Wing area, 1,114 sq. ft.
Wing span, 114 ft. 0 in.
Crew weight, 1,000 lb.
Engine, Liberty 12-cyl. V-8, 300 hp.
Pilot, Lt. E. Frost, U. S. N.

EDITORIAL NOTE

Owing to the restrictions of space, the characteristics of the aircraft entered in the race and the relative merits, for the Detroit News Aerial Mail Trophy, the Aviation Country Club at Detroit Trophy (Oct. 31), and the Liberty Engine Builders' Trophy (Oct. 15) will be published in the Oct. 9 issue of AVIATION.

Characteristics of the Aircraft Entered in the Pulitzer Trophy Race

Saturday, Oct. 14, 1922

The Pulitzer Trophy race this year has received a very large number of entries by the Army Air Service and Naval Aviation—twenty-one altogether. With the exception of the six Thomas-Morse ME3 and the VCP-10 pursuit ships entered by the Army and the Curtiss biplanes entered by the Navy, every entry is a new type, specially built for this race, or a development of a previous type.

The new Army type comprises two Curtiss Racers, two Looming Racers, two Thomas-Morse Racers, and three Verville-Sperry Racers. In addition the Army entered in the Pulitzer Race one VCP-10—the type on which Capt. C. C. Massey won the first Pulitzer Trophy race, in 1920, and six Thomas-Morse ME3's pursuit ships.

The Navy entries include an improved model of the Navy Curtiss racer on which Earl A. Doolittle won the 1921 Pulitzer Race; the Curtiss Triplane racer, which finished second in last year's race; a "nocturnal ship" known as the "Havoc" type; a Sea-Lee (Booth-Thurston) racer specially designed for this year; and a Thomas-Morse ME3 racer.

Following are the characteristics of the new ships entered this year, and a Thomas-Morse ME3 racer.

The Navy-Curtiss Racers

The Curtiss company has built for the Navy two biplanes of this type, the only difference between the two being that one carries the Lambda type of radiator in the landing gear while the other is equipped with the wing type radiator, specially developed by Curtiss engineers, and described in the Army entry. The characteristics of the Navy-Curtiss biplanes resemble structural features which are significant of the development of the art. The plane, although primarily developed as a fighting unit of the Navy has an extraordinarily high factor of safety.

Its wings are covered for their multi-spar construction, and have a Curtiss ply covering instead of the conventional cloth. The ribs of such ply-wood construction at least maintain the proper wing curve, and have far more strength than fabric. The airplane built for the Navy has a general clearance of design that makes it stand out. It is streamlined from the nose of the propeller to the tail. Fittings, struts, etc., all

are streamlined, thus being the perfect adaptation of line around cut for the last year in the Curtiss wing instead of Gordon City. There is a marked improvement in radiator, and in motor covering. The C12 engine, a twelve-cylinder type, developing 400 hp. at 2000 rpm. lends itself particularly well toward streamlining.

The maximum speed of the Navy racer, an originally fast last year was in excess of 150 m.p.h., and low speed 70 m.p.h. Improvements in design and construction this year tend the builders to believe that a greater high speed and possibly a lower landing speed can be obtained. Even so, there is a very wide range of speed which makes the ship valuable for purely military purposes, in the scheme of marine defense as developed by the United States Navy.

A simplified string system reduces the number of tanks and parts to a minimum. The ships have an improved type of oil cooler, which maintains a constant oil temperature, and which is low enough to permit the cooler to deliver its maximum horsepower when it is operated under full throttle, and streamered to the extreme degree. Inasmuch as its prior use in the country and abroad, much of the effort before was in the absorbing of oil and improper radiations, the Curtiss engineers believe that this feature will be of distinct advantage to the extent which they have constructed for the Army and the Navy.

In the construction of these biplanes, the fullest possible use has been made of aluminum and duralumin. This has the secondary result of adding strength to the various members and also reducing weight. Typing tanks, fittings, etc., are of the material in many instances.

Following are the general characteristics of the Navy-Curtiss Racer, horsepower at 400 at 2000 rpm. Curtiss C12 motor.

CHARACTERISTICS

Span (spread), 22 ft. 6 in.
Length, 11 ft. 9 in. 1/2
Wing area, 200 sq. ft.
Gross weight, 400 lb.
Gross weight, 400 lb.
Gross weight, 400 lb.
Gross weight, 400 lb.

Max. speed, 150 m.p.h.
Max. speed, 150 m.p.h.



One of the two Army-Curtiss Racers (275 hp. Curtiss D12) entered by the Air Service in the Pulitzer Trophy race. Pilots: Lt. R. L. Monaghan and Lt. E. J. Woodard

Wing area, 200 sq. ft.
Gross weight, 400 lb.
Gross weight, 400 lb.
Gross weight, 400 lb.
Gross weight, 400 lb.
Gross weight, 400 lb.
Gross weight, 400 lb.
Gross weight, 400 lb.
Gross weight, 400 lb.
Gross weight, 400 lb.
Gross weight, 400 lb.

Between 100 and 150 m.p.h. faster

The Army-Curtiss Racers

The two biplanes which the Curtiss Company designed and constructed for the Air Service represent a progressive development from 1920 when the first "Wildcat" was built.

Before arriving at the ultimate design, extensive investigation was made to determine the most efficient performance possible in a machine of this kind. Guided by wind-tunnel tests in which no actual flight tests of previously built racing planes, choice was made of a biplane, the air resistance of which was to be reduced to a greater extent than ever before achieved.

The body structure is formed with "Curtiss-ply," a strong, light 2-ply rayon of laminated spruce 3/32 in. thick. The rest of the fuselage was designed around the most possible cross-sectional area, merely large enough to fit in the engine and to accommodate the pilot. The projected area of the body is 35 per cent less than that of the Curtiss Navy Racer which won last year's Pulitzer Trophy Race.

The weight of the body complete is only 127 lb. due to the application of duralumin fittings, together with the use of the Curtiss-ply construction which proved so successful in previous war.

Light weight, rigidity and motor stiffness are features of the multi-spar Curtiss-ply covered wings. The Curtiss 22 wing section is one developed by engineers from data obtained from testing high speed curves in the elaborate wind-tunnel maintained at Garden City.

The wing radiator, designed and patented by the Curtiss Company deserves special mention. Many tests were made with their streamlined, shut brass radiator surfaces which replace the surfaces of the wings. With this system, advantage is taken of the flow of air around the wings, which cools the

engine water without any extra head resistance whatever. They were considered for use on the Curtiss Triplane racer of two years ago, but as they were still in the experimental stage, it was decided to defer their use until complete data was available on their characteristics. Since that time they have been tested on occasionally, the first important demonstration being their fine performance on an "Ochre" at the Nevada Meet last spring. The most severe test was a cross-country flight by pilot "Curry" Jones, of nearly 1500 miles from New York to Kansas City, at an average speed 180 m.p.h. During extensive period shown on this type of radiator, the Curtiss Company believes the development and use will bring about an important advance in aeronautical progress.

The end surfaces, fin and stabilizer are of the Curtiss-ply multi-layer construction, with an internal bracing. Control surfaces, ailerons, elevators and rudder, are of steel and duralumin, laminated; they weigh 7/10 the lb. per square foot of area. All controls are actuated by means of internal cables and operating tubes.

The single-strut type of chassis used has the strength and rigidity of the conventional "V" chassis, yet the resistance has been reduced two-thirds. Even the wheels and hub caps have been made of aluminum. Wheels are provided with rubber tires of aluminum which cover the spokes and hub, a base covering is applied over the wheel and tire in such a manner that a smooth oval section is presented to the air stream.

The landing gear is made of laminated wood-grain ply, forming an effective shock-absorbing and adding little to the total resistance of the machine.

A striking outer scheme has been selected to give the machine a unique appearance. The body struts, stabilizer and rudder are finished in dull black. The natural finish of the brass wing radiators is carried out with the same outer finish on the Curtiss-ply wing ends and on the elevators. The rudder is striped with the customary red, white and blue, and the one nearest appears underneath the lower wing panels, near the tips.

CHARACTERISTICS

Span, 22 ft. 6 in.
Length, 11 ft. 9 in. 1/2
Wing area, 200 sq. ft.
Gross weight, 400 lb.
Gross weight, 400 lb.
Gross weight, 400 lb.
Gross weight, 400 lb.
Gross weight, 400 lb.
Gross weight, 400 lb.



Navy-Curtiss Racer (400 hp. Curtiss C12) entered by the Navy in the Pulitzer Trophy race. This ship has wing radiators, while its sister has Lambda radiators. Pilot not yet designated

Johnson, 800 sq. ft.
 Curtiss motor, 115 h.p. B.
 Radius, 8 ft. 6 in.
 Wing span, 27 ft.
 Wing loading, 10.5 lb. sq. ft.
 Performance:
 Cruise speed, 60 m.p.h.
 Max. speed, 70 m.p.h.
 Max. climb, 1,000 ft. per min.
 Altitude, 10,000 ft.
 Cruise time, 100 ft.
 Cost, \$100 B.

The Navy-Curtiss Triplane

The triplane designed and built by the Curtiss Aeroplane and Motor Corp., was brought out in 1930 as an American entry for the Gordon Bennett race held in France. It was designed by W. L. Hildebrand, with the aid and supervision of Thomas H. Curtiss, as a triplane with a landing speed of around 300 m.p.h. Under trials carried on, on the fields on Long Island, that landing speed was found to be entirely practicable, but on arrival in France, due to the condition of the fields and to the shifting of the starting point from one field to another, it was necessary to add a second wing in order to reduce the landing speed. This was obtained and a new figure of low flight of 80 m.p.h. realized. On its return to the United States, it was prepared for entry in the Pulitzer

Wing race, 1930 m. B.
 Curtiss motor, 115 h.p. B.
 Radius, 10 ft.
 Wing span, 27 ft.
 Wing loading, 10.5 lb. sq. ft.
 Performance:
 Cruise speed, 60 m.p.h. at low level
 Max. speed, 80 m.p.h. at low level
 Cruise speed, 14,000 ft. in 10 min.
 Altitude, 10,000 ft.
 Cruise time, 100 ft.
 Cost, \$100 B.

The Bonavia (Beech) Biplane

The Bonavia biplane of the Navy was designed and built by Maurice Bonavia and Thomas H. Curtiss, of the Curtiss Aeroplane and Motor Corp., Hammondsport, N. Y., who a year ago were co-designers of the Curtiss Aeroplane and Motor Corp. and worked in the design of the Navy Curtiss 1931 biplane. Therefore, it may be considered that the NB will incorporate a good deal of the experience of the CB type.

The NB represents an attempt to take another step in the matter of aerodynamic refinement, supplanting completely the structural features required by virtue of a biplane by the use of an advanced monoplane wing. In addition, there is a retracting landing gear by which the entire landing gear is retracted into the body of the fuselage over the plane in the rear so that in flight only the fuselage and wings present resistance to the air.

A further innovation of a freshly experimental character has been found on one of the NB planes and this is the complete suppression of the radiator which all water-cooled engines have to have carried for them. This is done by covering the entire wing with a thin sheet of copper under which the water circulates so that the wing does double duty, both in performing the double function of cooling the engine and supporting the weight of the plane.

In general the NB airplanes represent in their design and construction not only the latest work, but also the radical innovation in design which, if successful, will have a profound influence on the future design of high performance efficiency and speed airplanes. The NB planes are fitted with the Wright H3 special high compression engine developing 400 hp.

CHARACTERISTICS

Type, triplane monoplane.
 Price, \$10,000.
 Length, 11 ft. 6 in.
 Height, 8 ft. 6 in.
 Wing span, 27 ft.
 Wing area, 210 sq. ft.
 Cruise speed, 60 m.p.h.
 Max. speed, 80 m.p.h.
 Max. climb, 1,000 ft. per min.
 Altitude, 10,000 ft.
 Cruise time, 100 ft.
 Cost, \$100 B.

The Landing Racers

The two Landing Racers entered in the Pulitzer Trophy race by the Army Air Service, were designed and constructed by Packard, Motor Car Co. of Detroit. Contrary to the usual practice heretofore where the fuselage of the airplane is customarily considered the chassis upon which the motor is mounted, in these new Landing Racers, the fuselage, radiators, wing, and the motor wing structure are the chassis members also, and the engine is mounted directly on them in a rugged and simple manner. The entire structure of these machines has been reduced to a simplicity in construction and details that has caused very few comments among airplane experts who have examined them.

The engine used on these planes is the new 600 hp., 12 cyl. Packard specially developed for the Army Air Service by the Packard Motor Car Co. of Detroit. The engine is installed at the nose of the machine and is relatively so large in comparison to the small airplane that the engine itself extends over a third the distance of the fuselage back to the rear end of the wings. It is comparatively large not only of the engine and the appearance of the airplane that has led to the comment frequently made about this machine that it is the simplest flying engine ever built and is exactly the opposite extreme to instantaneous power applied in an airplane from the glides with no power that have been recently shown in Germany.

The outstanding feature of this machine is that it is the most highly powered airplane for its size ever built. The total

weight of the machine with gasoline, oil, and including the weight of the pilot, ready for flight, is 2300 lb. and since the engine is capable of developing 600 hp., the whole airplane, engine, fuel and all go into this air at the extremely low power loading of 4.2 lb. per horsepower, a figure which has never up to now been attained either in this country or Europe. The last point to be compared in this is that of the first sport racing machine in France upon which Rollé-Leonard made its records last year, which was 4 lb. per horsepower. It has, therefore, been estimated that this airplane should be well over the 100 m.p.h. mark and since the wing loading is only 16 lb. in the narrow foot, whereas many racing airplanes have gone up to 18 lb. in the square foot, the pilots airplane accordingly gives considerable to the machine in making the sharp turns of the course.

The relative weights of the airplane are also very interesting. The whole airplane (wings, landing gear, fuselage and

representing a further development of the MBT which was produced for last year's Pulitzer race. The TM20 machine was subsequently for the fact that there are entirely of metal construction, the wings and fuselage being covered with staggered sheet duralumin. Duralumin is also used in the construction of the fuselage, wing and tail plane structures, while the engine mounting is of steel tubing.

CHARACTERISTICS OF THE TWO RACERS

Type, triplane.
 Price, \$10,000.
 Length, 10 ft. 6 in.
 Height, 8 ft. 6 in.
 Wing span, 27 ft.
 Wing area, 210 sq. ft.
 Cruise speed, 60 m.p.h.
 Max. speed, 80 m.p.h.
 Max. climb, 1,000 ft. per min.
 Altitude, 10,000 ft.
 Cruise time, 100 ft.
 Cost, \$100 B.

The Thomas-Morse MB2 racer is of more orthodox construction, with tube covered wings and fuselage, the structure of which is of wood.



The Navy E-2 (Bonavia) racer (500 hp. Wright) entered in the Pulitzer race. Pilot, J. W. Hildebrand, U.S.N., or L. D. Hildebrand.

Race in Omaha in 1931. Again due to circumstances of poor field conditions, a third wing was added, thus reducing the landing speed to a triplane to 70 m.p.h.

The Navy-Curtiss triplane will appear in Detroit as practically a new machine. It will be powered with a 430 hp. C12 geared engine, constructed by the Curtiss Aeroplane and Motor Corp. By giving the motor the propeller races at three-fifths of the engine's speed.

The triplane has a streamline upper wing, which is described more fully under the Army entry. Its fuselage is of monoplanes, and is constructed of duralumin. A characteristic of the triplane is its radiator. It is equipped with a full-size Curtiss radiator attached to the fuselage.

The motor of the triplane will be as follows: red fuselage, silver wings, steel chassis.

CHARACTERISTICS

Type, triplane monoplane.
 Price, \$10,000.
 Length, 11 ft. 6 in.
 Height, 8 ft. 6 in.
 Wing span, 27 ft.
 Wing area, 210 sq. ft.
 Cruise speed, 60 m.p.h.
 Max. speed, 80 m.p.h.
 Max. climb, 1,000 ft. per min.
 Altitude, 10,000 ft.
 Cruise time, 100 ft.
 Cost, \$100 B.



One of the two Landing Racers (600 hp. Packard) entered by the Army Air Service in the Pulitzer Trophy race. Pilot, J. E. C. Whitcomb and L. D. Schuler.

weight 500 lb., which is one-third the weight of the power plant, including engine, radiator, water, etc. It may readily be understood that this is an unusual good when it is realized that on most airplanes the weight of the airplane portion is usually equal to and sometimes as much as twice as great as the weight of the power plant.

The race tank is back of the engine and carries 115 lb. fuel, sufficient for a flight of 300 miles. The point also well to the rear of the whole plane, with extremely good visibility, particularly for landing, and is entirely protected from the wind, which on such fast machines becomes a very serious matter. The construction of the machine was kept secret up to Sept. 18, when the Landing Race Association Engineering Corp. held an exhibition of the machine prior to its shipment to Detroit, for airplane experts in this vicinity.

CHARACTERISTICS

Type, triplane monoplane.
 Price, \$10,000.
 Length, 11 ft. 6 in.
 Height, 8 ft. 6 in.
 Wing span, 27 ft.
 Wing area, 210 sq. ft.
 Cruise speed, 60 m.p.h.
 Max. speed, 80 m.p.h.
 Max. climb, 1,000 ft. per min.
 Altitude, 10,000 ft.
 Cruise time, 100 ft.
 Cost, \$100 B.

The Thomas-Morse Racers

Not counting the Thomas-Morse MB2 ships, which are standard pursuit machines, the only airplane specially built for 600 coast by the Blumson firm will participate in the Pulitzer Trophy race. Two of these ships, designated as Model TM20, are covered by the Army, while the third, Model MBT, is owned by the Navy.

These two types have a notable family resemblance in that both are named wing semi-canoe-type monoplanes, the TM22

CHARACTERISTICS OF THE TWO RACERS

Type, triplane monoplane.
 Price, \$10,000.
 Length, 10 ft. 6 in.
 Height, 8 ft. 6 in.
 Wing span, 27 ft.
 Wing area, 210 sq. ft.
 Cruise speed, 60 m.p.h.
 Max. speed, 80 m.p.h.
 Max. climb, 1,000 ft. per min.
 Altitude, 10,000 ft.
 Cruise time, 100 ft.
 Cost, \$100 B.

The Verville-Sperry Racers

Two Verville-Sperry Racers have been entered in the Pulitzer race by the Army Air Service. These ships were built by the design of Alfred V. Verville, of McCook Field, by the Sperry Aircraft Co., at Farmingdale, L. I. They are outstanding internally braced monoplanes and are equipped with a special high compression type H3, 300 hp. engine built by the Wright Aeronautical Corp. of Paterson, N. J.

Features of construction are:

- (1) Retractable wide track landing gear.
- (2) The wheels are on built-in they extend out under the wings and fold up under the wings when the machine is in flight.
- (3) What is believed to be an absolutely unique feature is a shock absorbing gear.
- (4) The fuselage and tail surfaces are completely constructed of steel tubing. This development has been incorporated in the Sperry ships that production upon a large scale is now possible.
- (5) The Verville-Sperry plane has an adjustable stabilizer. This means that it will be possible to adjust the angle

(Naval Aviation Continues)

Naval Orders—Lt. Guy D. Townsend, det. Aircraft Sqds., Beaufort, Fla., to War Air Sta. Hampton Roads, Va.
Lt. Patrick J. Kane, det. Naval Academy, Annapolis, Md., to command War Air Sta. Cape May, N. J.
Ensign, Desmond S. Garvey, det. War Air Sta. Pensacola, Fla., to U.S.S. Florida.
Ensign, Edward P. Sprague, det. War Air Sta. Pensacola, Fla., to U.S.S. Delaware.
Lt. John D. Price, det. Office, General Inspector of Naval Aircraft, McCook Field, Ohio, to Naval Aircraft Factory, Philadelphia, Pa.

Foreign News

Baku—Slovak airmen are resuming their activities. The PV has been transferred to the airport of Pampoli and will be employed for passenger service. Some of the Army and Navy squadrons which had been defeated and stood, will be reactivated and put in service as soon as possible.

Three trials a certain rivalry between two parties, one of whom would build a Sokolet winged type of a small capacity 20,000 cu. m. to embody the latest improvements of a winged, while the other party would build the great T type of 120,000 cu. m. in the design of Gorbil. The first group states that the jump from 34,000 cu. m. to 200,000 cu. m. in two steps, and the cost of the design would be equivalent to that of the 20,000 cu. m. capacity would permit the utilization of a quantity of material left over from the second T34 which was left behind. Furthermore it is desired to make comparative tests with the rigid Sokolet to show that the Sokolet is superior to a fixed wing type.

It is probable that both plans will be considered.

Netherlands—One million fliers (121,370 fliers) of flying with passengers, freight and mail were supplied by the Royal Netherlands Air Line Co. on July 30, 1933, over eastern Britain, Amsterdam, in advance to the Department of Commerce.

Not a single accident has occurred, the record reports. This company has a daily service between Amsterdam and Paris and a twice a day service between Amsterdam and London. The distance over each of these routes is approximately 300 miles.

Texas—Hawthorne Airways represented their transport service recently with an aerial route from London to Birmingham, Birmingham leaving London at 5:00 a. m. and scheduled to arrive at Birmingham at 5:10 p. m., with stops at Paris and Lyons. The actual flying time in flight is 10 hours. The actual journey is started at 5:00 a. m., London being reached at 5:30 p. m. Plans based on this service are made and Columbia, both equipped with Hawesone engines.

Great Britain—The British government, it is reported, has granted permission for a Bradford-Leeds-London passenger and mail service, according to Consul W. J. Young, at Bradford, England.

It is planned to have stations also at Doncaster, Ouseburn and Farnborough, the route to be served by four Avro airplanes. Captain Taylor, who obtained the license, is now flying at Bradford.

France—The London Times reports that the sale of 250,000 round by popular subscription, has been granted to the Portuguese naval service, Commanders Comstock and Cabot, in the form of a draft on London, for the purchase of airplanes as a gift to the Portuguese government in recognition of the London-Bas flight.

Where to Fly

CALIFORNIA	SAN FRANCISCO, CALIFORNIA EARL P. COOPER AIRPLANE & MOTOR CO.
CONNECTICUT	PARTNIDGE, Inc. Aeronautical Instruction New York of Boston. Mail Address: Field, Chicago, Ill. 408 E. Michigan Ave.
FLORIDA	One of the largest and best equipped flying fields in the United States KOKOSKO AVIATION CORP. Bakers, Sebring ALL TYPES OF CURTIS PLANE.
MARYLAND	Sebring Field, 5 miles S. E. of Baltimore All branches of Commercial Aviation Shops, Hangars and efficient Field Service BENTLEY AIRCRAFT Inc., Sebring, E. Box 104, Baltimore, Md.
MICHIGAN	AEROMARINE AIRWAYS, INC. Only Service in Cleveland MEMPHIS, N.Y. & RIVER DETROIT 15 Passenger Flying Colliers
MINNESOTA	WHITE BEAR LAKE, MINN. 1500 Yards Great and superb grounds Harold C. Peterson Aircraft Company SCHOOL OF AVIATION
NEW JERSEY	NEW YORK AIR TERMINAL New York - 2 miles from Times Square. Learn to fly and learn to fly now. Please contact Mr. A. CHAMBERLIN AIRCRAFT Philadelphia, Pa. 2
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INDEX TO ADVERTISERS

A		
Aeromarine Engineering & Sales Co.	401	
Aero Service Corp.	431	
Aircraft Service (London)	434	
B		
Boring Airplane Co.	430	
C		
Canadian Air	432	
Curtis Robinson Co.	436	
D		
Dayton Wright Co.	402	
Dugan, Ralph C., School of Aeronautics	403	
E		
Elliott, G. & Bro., Inc.	404	
F		
Fisher	425	
G		
Goodyear Tire & Rubber Co.	431	
H		
Half Toned Aero Corp.	436	
J		
Johnson Airplane & Supply Co.	436	
K		
Kellogg Aviation Corp.	431	
L		
Lorraine Aero Engine Corp.	426	
Lyons Standard Aircraft Corp.	435	
M		
Martin, The Glenn L., Co.	408	
N		
New Jersey Veneer Co.	432	
Northrop, Marvin A.	432	
P		
Pulsed Motor Car Co.	405	
Powers Instrument Co.	430	
R		
Reid, John A., Ross Co.	433	
S		
Serry, Lawrence, Aircraft Co., Inc.	430	
Spry, Electric Co.	430	
T		
Thomas-Morse Aircraft Corp.	407	
Thurston, W. Harris, & Co.	431	
Thompson Bros. Engine Co.	431	
Thomas, Inc.	431	
V		
Venture & Co.	430	
Vought, Chance, Corp.	430	
W		
Warner, Edward P.	427	
Washington, Sears & Co.	432	
Wheeler, S. P.	434	



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